Flow corresponding to a Peclet number doubles the limiting current densities in 0.01 M, 0.5 M, and 1 M electrolytes with flow rates at millimeter per second and increased current densities with elevated flow rates. Numerical analysis showed that the flow-through electrolyte replenished consumed zinc ions at the electrode surface and suppressed dendrite proliferation by maintaining homogeneous current density distribution. These studies provide an effective strategy on dendrite suppression by converting diffusion-limited reactions to convection-dominated process.